REMARKS

The Examiner in the final office action rejected claims 1, 12, 13, 15, 17, 18, 20, 21, 23-25, 33-35, 38-52, 55-57, 61, 62, 68-70, and 72-74 under 35 U.S.C. §103(a) as being unpatentable over *Dorel* '784 in view of *Thomeer et al.* '003. Claim 2 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Dorel* as modified by *Thomeer et al*, as applied to claim 17, further in view of *Dismukes* '856. (The Final Office Action on page 4 states that claim 54 is also rejected with claim 2. However, the examiner on pages 1 and 8 specifically indicates that claim 54 is allowable over the prior art and therefore applicant assumes that claim 54 is allowable.) Claims 3, 7, and 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Dorel* as modified by *Thomeer et al*, as applied to claim 1, further in view of *Williams et al.* '337. Claims 22, 59, and 60 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Dorel* as modified by *Thomeer et al*, as applied to claim 21, further in view of *Colin et al* '145. Claims 53 and 58 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Dorel* as modified by *Thomeer et al*, as applied to claims 17 and 21 respectively, further in view of *Wu* '267. Claims 10 and 54 were objected to as being dependent upon a rejected base claim. Applicant acknowledges with appreciation the allowance of claims 64-67 and 71.

Claims 10 and 54 have been rewritten in independent form including all of the limitations of the base claim and any intervening claims. Thus claims 10, 54, 64-67, and 71 are now allowable.

Claims 1, 12, 13, 15, 17, 18, 20, 21, 23-25, 33-35, 38-52, 55-57, 61, 62, 68-70, and 72-74 were rejected under § 103(a) as being unpatentable over *Dorel* in view of *Thomeer et al.* Claims 1, 17, 21, 33-35, and 38 are independent claims with the other claims being dependent claims. Claims 1, 12, 13, 15, 17, 18, 20, 21, 23-25, 33-35, 38-52, 55-57, 61, 62, 68-70, and 72-74, as amended, are all distinguishable over the cited prior art.

Dorel discloses an apparatus for directional drilling using metal coiled tubing 20. Col. 1, ll. 37-39. Metal coiled tubing 20 is connected at its lower end to the head 19 of a logging tool 18. An orienting tool 17 is connected to the logging tool 18 at its upper end and to a drilling assembly 11 at its lower end. The drilling assembly 11 includes a mud motor 13, a bent housing 12, and a drill bit 15. The drilling assembly 11 also includes an electric motor 24 to rotate the

bent housing 12 and to selectively rotate the drilling assembly 11. An armored electrical cable or wireline 5 extends inside the coiled tubing 20 throughout its length to power motor 24 and for data acquisition and sending. The electric motor 24 rotates the bent housing 12 to orient the bend B in the bent housing 12. The bend B in the housing is either fixed or set at the surface and is not adjustable downhole.

Claims 1, 12, 13, 15, 17, 18, 20, 21, 23-25, 33-35, 38-52, 55-57, 61, 62, 68-70, and 72-74, as amended, are all distinguishable from *Dorel* because independent claims 1, 17, 21, 33-35, and 38 require either a propulsion system or a prime mover and *Dorel* does not teach a propulsion system or prime mover. The Examiner suggests that the mud motor 13 in the drilling assembly 11 is a propulsion system/prime mover because it rotates the bit. A mud motor cannot serve as the claimed propulsion system/prime mover and *Dorel* does not teach a propulsion system/prime mover. A propulsion system or prime mover moves the well apparatus, such as a drilling assembly axially through the borehole. In drilling, the propulsion system or prime mover applies weight on the bit so that the bit will drill. In *Dorel,* The drilling assembly 11 is forced downhole by the injector head 6. The mud motor of *Dorel* rotates the bit and does not move the drilling assembly 11 axially through the borehole. Thus the cited prior art does not teach the propulsion system or prime mover set for in each of the claims 1, 12, 13, 15, 17, 18, 20, 21, 23-25, 33-35, 38-52, 55-57, 61, 62, 68-70, and 72-74. Thus these claims, without more, are allowable over the cited prior art.

Further with respect to claims 1 and 17, as amended, *Dorel* does not teach a downhole propulsion system which engages the borehole sidewall to propel the well apparatus along the borehole axis. The mud motor 13 of *Dorel* rotates the drill bit 15 and does not engage the borehole sidewall to propel the drill bit 15 along the borehole axis.

Further with respect to claim 21, as amended, *Dorel* does not teach a downhole propulsion system which propels and forces the member for displacing formation into the formation. The mud motor 13 of *Dorel* rotates the drill bit 15 and does not propel or force the drill bit 15 into the formation.

Further with respect to claim 33, as amended, *Dorel* does not teach a prime mover <u>and</u> a downhole motor. *Dorel* does not teach a prime mover pulling the composite pipe and forcing the

drill bit axially downstream into the formation. The Examiner argues that the mud motor is the prime mover. However the mud motor of *Dorel* cannot be both the prime mover and the downhole motor of claim 33.

Further with respect to claim 34, as amended, *Dorel* does not teach a prime mover <u>and</u> a downhole motor. The mud motor of *Dorel* cannot be both the prime mover and the downhole motor of claim 34. Also *Dorel* does not teach a steerable assembly which has an actuator that adjusts <u>both</u> the angular orientation and the bend angle. *Dorel* only can adjust the angular orientation downhole. Still further *Dorel* does not teach a prime mover responsive to signals received by the steerable assembly. *Dorel's* mud motor is not responsive to data signals.

Further with respect to claim 35, *Dorel* does not teach a prime mover <u>and</u> a downhole motor. The mud motor of *Dorel* cannot be both the prime mover and the downhole motor of claim 34. Also *Dorel* does not teach an articulated joint having first and second portions which form both a bend angle and an angular orientation. *Dorel* teaches an orienting tool 17 mounted above the mud motor 13 with the bent housing 12 and drill bit 15 mounted below the mud motor 13. The orienting tool 17 only changes angular direction and not bend angle. The steerable assembly of claim 35 includes an actuator that adjusts <u>both</u> the angular orientation and the bend angle. *Dorel* only can adjust the angular orientation downhole using electric motor 24. *Dorel* cannot adjust the bend angle downhole. Still further *Dorel* does not teach a steerable assembly responsive to a communication link to alter the second portion three dimensionally with respect to the first portion.

Further with respect to claim 38, *Dorel* does not teach a propulsion system that applies a downstream force on the string of composite tubes pulling the string downhole. The mud motor 13 of *Dorel* does not apply a downstream force nor does it pull a string downhole.

For all of the above reasons, claims 1, 12, 13, 15, 17, 18, 20, 21, 23-25, 33-35, 38-52, 55-57, 61, 62, 68-70, and 72-74, as amended, are allowable over *Dorel* and *Thomeer et al.* since *Thomeer et al.* does not teach any of the missing limitations of *Dorel.*

Further, the Examiner suggests that it would be obvious to replace the *Dorel* metal coiled tubing 20 with the composite fluid conveying tubing of *Thomeer et al.* '003. *Dorel* teaches the use of metal coiled tubing as the drill string for drilling a well. *Thomeer et al.* '003 discloses a

composite coiled tubing for treating wells which have already been drilled. *Thomeer et al.* '003 teaches a downhole tool 20 connected to a composite coiled tubing 16. The downhole tool 20 is used to conduct flow or measurements or perhaps to provide diverting fluids. (col. 6, ll. 8-11). The composite coiled tubing apparatus is particularly directed to the treating of wells. (col. 8, ll. 16-22; col. 12, ll. 3-9). *Thomeer et al.* '003 contemplates using a tubing injector 48 at the surface to place a compression force on the composite coiled tubing 16 to force the composite tubing 16 into the non-vertical portions of the well. The composite coiled tubing 16 includes a plurality of fiber layers 77, 78, and 79 which provide a weave around a solid liner 76. The fibers are engineered to avoid buckling the tubing 16 as the tubing 16 is forced into the well. The composite coiled tubing 16 has a section modulus and section properties which vary along the length of the composite coiled tubing so that the predetermined characteristics of the coiled tubing, including stiffness or strength, may be varied to avoid buckling. (col. 21, l. 50-53; col. 22 l. 20-24 and l. 50-56; col. 24 l. 5-10). *Thomeer et al.* '003 does not teach the use of composite coiled tubing for drilling.

There is no suggestion or motivation to substitute the composite coiled tubing 16 of *Thomeer et al.* for the metal coiled tubing 20 of *Dorel*. *Thomeer et al.* teaches a composite coiled tubing apparatus and method for conveying fluids downhole in a wellbore, as for example to treat the well, while *Dorel* teaches a metal coiled tubing as a drill string to drill a well. The objectives and functional requirements between fluid conveying tubing and drill strings are completely different.

The composite coiled tubing 16 of *Thomeer et al.* is designed for different types of loading than that of the metal coiled tubing 20 of *Dorel*. Torque cannot be applied to composite coiled tubing while limited torque may be applied to metal coiled tubing during drilling. Torque is caused by the counter rotation of the downhole motor due to the rotation of the bit by the downhole motor. See US Patent 5,485,889 to *Gray* and US Patent 5,738,178 to *Williams et al.* *Dorel* teaches rigidly fixing the lower end of the metal coiled tubing 20 so that electric motor 24 can rotate the bent housing 12 and/or the bit 15. Thus *Dorel* contemplates that the drill string withstand the torque from motor 24.

The tension and compression loads are completely different. Fluid conveying tubing merely extends from the surface down into the well adjacent the producing formation for conveying fluids down into the wellbore and into the formation. As discussed at col. 1, l. 51 through col. 2, l. 38; col. 6, l. 47 through col. 7, l. 11; and col. 16 l. 12-67, the composite coiled tubing 16 of *Thomeer et al.* is designed to withstand compression so that the composite coiled tubing can be pushed into and out of the well by a coiled tubing injector 48. Thus, the *Thomeer et al.* composite coiled tubing is designed for compression loads not tension loads while metal coiled tubing must withstand both compression and tension loads applied by the drilling system.

The *Thomeer et al.* composite coiled tubing is not designed for use with a drilling system which places cyclic loading on the coiled tubing such as during drilling. Fluid conveying tubing is static while drill strings are dynamic and must withstand the dynamic forces caused by the drilling operation including the loads applied by the bit and downhole motor. The metal coiled tubing of *Dorel* is designed to withstand dynamic loading caused by the drilling action of the drilling assembly. Therefore the *Thomeer et al.* tubing is not designed for use with a drilling assembly such as that taught by *Dorel*.

The design objectives of *Thomeer et al.* are different from those of *Dorel*. The *Thomeer et al.* tubing is engineered to avoid buckling under compression. *Thomeer et al.* discusses extensively the problem of the buckling of coiled tubing while being injected into a well. See col. 1, l. 20-22; col. 1, l. 51-62; col. 2, l. 21-29; col. 3, l. 31-43; col. 3, l. 63-65; col. 6, l. 47-67; col. 7, l. 1-10; col. 7, l. 64-67; col. 12, l. 3-15; col. 12, l. 59-67; col. 13, l. 1-9; col. 14, l. 22-24; col. 16, l. 12-35; col. 16, l. 44-67; col. 17, l. 1-30; and col. 21, l. 17-22. The composite coiled tubing of *Thomeer et al.* has a section modulus and section properties which vary along the length of the coiled tubing so that predetermined characteristics of the coiled tubing, including stiffness or strength, may be varied to avoid the problems of buckling and lock up of the coiled tubing as it is being pushed down into the well. *Thomeer et al.* does not teach composite coiled tubing which is engineered with a constant section modulus and section properties such as for drilling. *Thomeer et al.* specifically teaches away from such constant properties because such constant properties do not solve the problem of buckling.

The *Thomeer et al.* composite coiled tubing cannot be used for drilling a well because the depth of the borehole must be known to use fluid conveying tubing which has a section modulus and section properties which are specifically designed to vary along a known length of the composite coiled tubing. The *Thomeer et al.* tubing can be engineered with such precision because the depth of the formation is known for the fluid treatment of the formation. Because the depth is known, the composite coiled tubing string may be custom designed for a particular tubing string length with its section modulus and section properties varying in a known manner along the length of the coiled tubing to comport with the characteristics of the borehole. In drilling, the tubing string cannot be precisely engineered because the length and loads on the tubing vary with the depth of the drilling assembly as the borehole is being drilled.

The Examiner's comment that the composite tubing of *Thomeer et al.* undergoes numerous bending events each time the well assembly is run in and out of the hole does not equate to the axial and yield stresses placed on composite tubing from a propulsion system or prime mover that is attached to the composite tubing and is pulling the tubing into the well together with dynamic loads placed on the tubing, particularly in the case of drilling.

Therefore, for all these reasons, there is no suggestion, motivation or reason to believe that one skilled in the art would consider substituting the *Thomeer et al.* fluid conveying tubing for the drilling metal coiled tubing of *Dorel*. For these reasons, all of the claims are allowable.

Further with respect to claim 1, neither *Dorel* nor *Thomeer et al.* teach composite tubes having fibers engineered to cause the tubes to withstand all of the axial and yield stresses placed on a string attached to a propulsion system propelling a well apparatus in the well. Neither reference teaches a propulsion system or a propulsion system powered by fluids circulating through the composite tubes. As set forth above, the mud motor 13 of *Dorel* is not a propulsion system or a prime mover.

Dependent claims 12, 13, 15, 18, 20, 23-25, 39-52, 55-57, 61, 62, 68-70, and 72-74 are allowable as claiming a patentable system in combination with the elements of independent claims 1, 17, 21, 33-35, and 38.

Claims 12, 13, 15, and 48-52 are allowable as claiming a patentable apparatus in combination with the elements of claim 1. With respect to claims 12 and 13, neither reference

teaches placing an electrical conductor adjacent the load carrying fibers. *Thomeer et al.* does not convey electrical power downhole but only conveys signals for communication with the surface. Applicant traverses the examiner's comments that conductive wires 107, 108 of *Thomeer et al.* are "power conductors." *Thomeer et al.* teaches using wires 107, 108 to transmit signals, not electricity (Col. 8, ll. 48-51). With respect to claim 15, neither reference teaches a propulsion system and therefore cannot teach a specific passageway through the drilling assembly for the flow of fluid. With respect to claims 48-50, neither reference teaches a wear layer or pressure layer around the load carrying layers of fibers. With respect to claim 51, neither reference teaches a propulsion system or powering a propulsion system with fluids circulating through the liner and up the annulus. With respect to claim 52, neither reference teaches a propulsion system or a single housing with traction modules.

Further with respect to claim 17, claim 17 is allowable for the same reasons as expressed with respect to claim 1. Neither *Dorel* nor *Thomeer et al.* teach composite tubes having fibers engineered to cause the tubes to withstand the axial and yield stress placed on a string attached to a propulsion system propelling a bottom hole assembly in the well. Neither reference teaches a propulsion system or a propulsion system powered by fluids circulating through the composite tubes. *Thomeer et al.* does not teach a composite tube having a power conductor to provide power to an attached bottom hole assembly. *Thomeer et al.* does not convey electrical power downhole but only conveys signals for communication with the surface. See Col. 8, ll. 48-51. Neither reference teaches a power conductor disposed adjacent fibers in the pipe.

Claims 18, 20, 56, 68-70 and 72-74 are allowable as claiming a patentable apparatus in combination with the elements of claim 17. With respect to claim 18, *Dorel* does not teach a bottom hole assembly for a non-drilling well apparatus. With respect to claim 20, *Dorel* does not teach a steering apparatus which changes both bend angle and angular orientation of the bend angle of the bit. With respect to claim 56, *Dorel* does not teach a three dimensionally, angularly adjustable joint. With respect to claim 68, the cited references do not teach the recited range of modulus. With respect to claim 69, the cited references do not teach the recited determination of the modulus of elasticity in the axial direction. With respect to claim 70, the cited references do not teach the specific modulus of elasticity in the axial direction. *Thomeer et al.* teaches a coiled

tubing having a section modulus and section properties which vary along the length of the coiled tubing so that predetermined characteristics of the coiled tubing including stiffness or strength are varied to avoid the problems of buckling and lock up of the coiled tubing as it is being pushed down into the well. With respect to claim 72, the cited references do not teach the determination of spoolable composite pipe. With respect to claim 73, the cited references do not teach a density substantially the same as that of the wellbore fluids. With respect to claim 74, the cited references do not teach the recited range of specific gravity.

Claim 21 is allowable for many of the same reasons as expressed with respect to claims 1 and 17. Neither *Dorel* nor *Thomeer et al.* teach non-metallic portions of the pipe string having fibers engineered to cause the non-metallic portions to withstand the axial and yield stress placed on a string attached to a propulsion system propelling a bottom hole assembly in the well. Neither reference teaches a propulsion system or a propulsion system powered by fluids circulating through the non-metallic portion. *Thomeer et al.* does not teach a non-metallic portion having a power conductor to provide power to an attached bottom hole assembly. *Thomeer et al.* does not convey electrical power downhole but only conveys signals for communication with the surface. See Col. 8, l. 48-51. Neither reference teaches a power conductor disposed adjacent fibers in the pipe.

Claims 23-25, 57, 61, and 62 are allowable as claiming a patentable apparatus in combination with claim 21. With respect to claim 23, neither cited reference teaches a steering assembly having the recited actuator. With respect to claim 24, neither cited reference teaches the recited power section powered by circulating fluids. With respect to claim 25, *Thomeer et al.* does not teach the claimed non-metallic portion engineered to provide the tensile strength to the string. With respect to claim 57, the cited prior art does not teach a bottom hole assembly with a central flow passage about the axis of the assembly. With respect to claim 61, the cited references do not teach a steerable assembly which is adjustable three dimensionally. With respect to claim 62, the cited references do not teach the claimed steerable assembly having spacer members.

Claims 33-35 and 38 are allowable for many of the same reasons as expressed with respect to claims 1, 17, and 21. The cited prior art does not teach a propulsion system or a prime

mover. In particular with respect to claims 34 and 35, *Dorel* does not teach a bend angle which is adjustable downhole.

Claim 55 is allowable as claiming a patentable apparatus in combination with claim 35. Further, neither reference teaches a propulsion system or a propulsion system powered by circulating fluids.

Claims 39-47 are allowable as claiming a patentable apparatus in combination with claim 38. Further with respect to claims 39 and 40, neither reference teaches a propulsion system or a propulsion system powered utilizing circulating fluids. With respect to claim 41, neither reference teaches the recited density range. With respect to claim 42, neither reference teaches a composite tube made of a fiber reinforced matrix. With respect to claim 43, neither reference teaches a connector for composite pipe. With respect to claim 44, as amended, *Dorel* does not teach an actuator for adjusting the bend angle. With respect to claim 45, *Dorel* does not teach a steerable assembly which adjusts the bend angle and angular orientation between the drill member and the steerable assembly. With respect to claim 46, *Dorel* does not teach an articulated joint which adjusts the bend angle and angular orientation between a first portion connected to a downhole motor and a second portion coupled a drill bit. With respect to claim 47, *Dorel* does not teach an electric motor in the steerable assembly for moving a second portion three dimensionally.

For all of the above reasons, claims 1, 12, 13, 15, 17, 18, 20, 21, 23-25, 33-35, 38-52, 55-57, 61, 62, 68-70, and 72-74 are now in allowable form.

Claim 2 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Dorel* as modified by *Thomeer et al*, as applied to claim 17, further in view of *Dismukes* '856. (The Final Office Action on page 4 states that claim 54 is also rejected with claim 2. However, the examiner on pages 1 and 8 specifically indicates that claim 54 is allowable over the prior art and therefore applicant assumes that claim 54 is allowable.) With respect to claim 2, as amended, neither reference teaches a composite tube made of materials such that the fluids around said composite tube cause said composite tube to achieve substantially neutral buoyancy within the well.

Claims 3, 7, and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Dorel* as modified by *Thomeer et al.*, as applied to claim 1, further in view of *Williams et al.* '337. Claims 3, 7, and 11 are allowable as claiming a patentable apparatus in combination with claim 1. With respect to claim 3, *Williams et al.* at Col. 3 l. 4-10 teaches a typical plastic matrix material used in a composite tube having a modulus of elasticity of between 100,000 and 500,00 psi. or greater and at Col. 4, l. 27-29 teaches a plastic binder in which the fibers are embedded to form a matrix having a modulus of elasticity that exceeds 100,000 psi. Such disclosures do not teach a composite tube having a modulus of elasticity in the range of 500,000 to 10,500,000 psi which can withstand axial and yield stresses due to in part a propulsion system. With respect to claim 7, the cited prior art does not teach a composite tube having a density which achieves a neutral buoyancy. With respect to claim 11, the cited prior art does not teach embedding an electrical power conductor non-axially in such a composite tube.

Claims 22, 59, and 60 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Dorel* as modified by *Thomeer et al.*, as applied to claim 21, further in view of *Colin et al.* Claims 22, 59, and 60 are allowable as claiming a patentable apparatus in combination with claim 21. With respect to claims 22, 59 and 60, there is no suggestion or motivation to combine the teachings of *Colin et al* with those of *Dorel* or *Thomeer et al.* *Colin et al.* is a connection device for cable and not for composite coiled tubing used in the oilfield. With respect to claims 59 and 60, *Colin et al.* does not teach seals sealingly engaging upon the mating of the cooperative surfaces to provide a hydraulic seal around the power conductor. *Colin et al.* does not teach seals or a power conductor.

There is no suggestion or motivation to combine the teachings of *Colin et al.* because *Colin et al* teaches a connection device for cable and not for composite coiled tubing used in the oilfield. Further, although *Colin et al.* discloses a connection device for connecting cables incorporating optical fibers and metal conductors, *Colin et al.* does not disclose connecting two pipes having a conduit therethrough for the flow of fluids.

Claims 53 and 58 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Dorel* as modified by *Thomeer et al.*, as applied to claim 17, further in view of *Wu* '267. Claims 53 and 58, are allowable as claiming a patentable apparatus in combination with claim 17. With

respect to claims 53 and 58, the cited references do not teach a propulsion system or a resistivity antenna disposed in a propulsion system. The examiner has provided no support for his assertion that it would be obvious to place a resistivity antennae in a propulsion system. Further, none of the cited prior art teaches a propulsion system or prime mover.

During the course of these remarks, Applicant has at times referred to particular limitations of the claims that are not shown in the applied prior art. This shorthand approach to discussing the claims should not be construed to mean that the other claimed limitations are not part of the claimed invention. They are as required by law. Consequently, when interpreting the claims, each of the claims should be construed as a whole, and patentability determined in light of this required claim construction. Unless Applicant has specifically stated that an amendment was made to distinguish the prior art, it was the intent of the amendment to further clarify and better define the claimed invention and the amendment was not for the purpose of patentability. Further, although Applicant may have amended certain claims, Applicant has not abandoned its pursuit of obtaining the allowance of these claims as originally filed and reserves, without prejudice, the right to pursue these claims in a continuing application.

If the Examiner has any questions or comments regarding this communication, he is invited to contact the undersigned to expedite the resolution of this application.

Reconsideration of the claims as amended and the allowance thereof is respectfully requested.

Respectfully submitted,

David A. Rose
Reg. No. 26,223
CONLEY ROSE, P.C.
P. O. Box 3267
Houston, Texas 77253-3267
(713) 238-8000
ATTORNEY FOR APPLICANT